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INTEROPERABILITY OF GNSS, LEGAL ISSUES AND IMPLICATIONS UNDER PRIVATE INTERNATIONAL LAW

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According to IEEE definition Interoperability is the ability of two or more systems or components to exchange information and use information that has been exchanged. In GNSS context, interoperability can be understood such that individual GNSS components should be designed, built and operated in such a way that they do not “jam” each other and allow one to combine their signal in a navigation service of superior quality, obviously, the combination of signals occurs in the user receiver, nevertheless it is up to the system to make combination easy and efficient. The three global navigation satellite systems — GPS, GLONASS, and GALILEO addresses the issue of their compatibility and interoperability with each other. For users, these represent crucial aspects of the relationship among GNSS, affecting such matters as cost of equipment, ease of use, and practical applications.. As the application varies depend on the requirement of end use, the legal issues also varies. Therefore legal regime varies based on its application. The issues for end user as to claim and jurisdiction are involved in private international law. This paper aims to address these issues.

Introduction

“Magnitude of commercial space activities today has brought about winds of changeⁱ”. There has been phenomenal growth of space technology and its application. A seamless worldwide navigation service for all kinds of users requires a “global system of systems” assuming interoperability and compatibility among the systems. One of the most important developments of the twentieth century has been the movement of humanity into space with machines and people. The underpinnings of that movement why it took the shape it did; which individuals and

organizations were involved; what factors drove a particular choice of scientific objectives and technologies to be used; and the political, economic, managerial, and international contexts in which the events of the space age unfolded—are all important ingredients of this epoch transition from an earthbound to a space faring peopleⁱⁱ. Exploration of space started with the pure scientific intention to know more about the world we live in, but in the modern time, activities in space is more centred around using space for the betterment of life on earth. The early

stages of space activates only saw the participation of very few states. All the investment towards the space sector was purely from the government exchequer and because of this reason; all the space treaties only mention the rights, obligation and responsibilities of the state government. It is true that the Outer Space treaty do have provision for activities of non-governmental entities. But the definition was very limited in scope and does not go into extended explanation. But recently, there is a steep rise in the use of outer space by states as well as other state institutions, international organisations and more importantly private enterprises. As stated above, all the international instruments governing outer-space were build-up and agreed before the high influx of commercial space activity and therefore, do not sufficiently take into account the implications and aftermath of the growing volume of commercial space activities.

Most of the outer space activities, whether by state entities or commercial entities, involve more than one country and effect large number of people. Moreover the investment for a single project on a space activity is considerable higher than any similar activity on earth. Like in any commercial activity, whether involving state or private companies, dispute of varying magnitude usually occur. Unlike a usual commercial dispute, this can affect large number of people in different countries and can jeopardize the progress into the frontiers of science. The development has led into areas of the law, of Insurance problems, and of details of intellectual property law and its further developmentⁱⁱⁱ.

Interoperability of GNSS poses innumerable issues to an end user with regard to claim and jurisdiction. Certainly interoperability signifies involvement of multiple GNSS Providers located in different jurisdiction having conflicting domestic laws. The task of an end user of space technology like any other regime in conflict of laws is to identify the appropriate applicable law for adjudication or claim. An end user in this context means only a category of person or persons who may suffer damage or infringement of his or their right from the person or entity with whom he is not contractually related from authorized use of system contemplated from GNSS.

GNSS, ICG and Interoperability

The Global Navigation Satellite System^{iv} is poised to be one of the most critical technologies in the twenty-first century and considered as an important element of the communications, navigations, surveillance etc, intended to provide worldwide coverage.

ICG (International Committee on Global Navigation Satellite systems) is a forum established on a voluntary basis as an informal body to promote cooperation, as appropriate, on matters of mutual interest related to civil satellite –based positioning,, navigation, timing and value added services, as well as the compatibility and interoperability of global navigation satellite system, while increasing their use to sustainable development. It held its first meeting in Vienna on 1 and 2 November 2006 and its second meeting in Bangalore India from 4 to 7 September 2007. The United Nations General Assembly in its resolution 61/111 of December 2006 noted with appreciation

on the constitution of ICG. ICG participation is open to all countries and entities that are either GNSS providers or users of GNSS services, and are interested and willing to actively engage in ICG activities. Within the ICG is the Providers Forum, consisting of those countries operating GNSS Systems or with plans to develop one. Forum provides a venue for coordination and cooperation to improve overall service provisions^v. One of the objectives of the Providers Forum is to promote compatibility and interoperability among current and future global and regional space based systems^{vi}. In the third meeting of ICG held in California during December 2008, Providers' Forum adopted principles of compatibility and interoperability and their future definition^{vii}. Term Interoperability is defined as follows

“Interoperability refers to the ability of global and regional navigation satellite systems and augmentations and service they provide to be used together to provide better capabilities at the user level than would be achieved by relying solely on the open signal of one system”.

The providers' Forum is not a policy making body but provides to promote discussion among system providers based on agreed guidelines for provision of open services etc. The current structure of ICG is to create Institutional mechanism to have meaningful and useful level of Interoperability and its standardization among GNSS Constellations.

Issues of private international law

Liability: In the context of private international law question arises to which national law governs for liability owing to damage on account of malfunctioning of interoperable navigation systems, Liability convention^{viii} cast absolute liability on a launching state for any damage caused by its space object on the surface of earth or to an aircraft in flight (Art II of Liability Convention 1972). It is to be noted Liability Convention does not contemplate any liability on account of damage being caused on account of malfunctioning of signal or deficiency of signal. In my paper^{ix} presented at IAC 2007 Hyderabad I have given my reasons why Liability Convention is not attracted in such scenario. My point was based on the reason that satellite signal has definite path and independent existence. In ATM (Air Traffic Management) application the accident caused by erroneous signal or bad signal and not by the satellite. The origin or source of signal may be satellite or due to failure in up linking or down linking. Therefore cause of bad signal attributable for accident requisite an enquiry which is not contemplated under Liability Convention as same unequivocally cast absolute

liability on launching state. It is clear the natural and legal persons having suffered damages from space objects must turn into common law (droit common) remedies under applicable national laws and before national courts^x. Here again problem to be identified is jurisdiction of national court to entertain an action in personam. How does an end user will be able identify which of the GNSS entity having faulted resulting in accident. It may require a probe and further complicate choosing a court of national jurisdiction. Under US Federal Torts Claim Act (FTCA) an action cannot be brought against USA for any negligence occurred outside US. Therefore for negligence occurred in outer space unless it shown that it has terrestrial link in US, the liability cannot be fastened. The basic rule at common law is the English court has no jurisdiction to entertain an action in personam unless the defendant has been personally served with a claim form in England or Wales^{x1}. Final Report on the establishment of a legal framework with regard to CNS/ATM system including GNSS presented before 35th session of International Civil Aviation Organization (ICAO)^{xii} "identifies that substantive law may be reasonably adequate to determine or apportion liability from accidents involving failure or malfunction of GNSS systems,

the procedural rules and, in particular, the applicable rules on jurisdiction may not be adequate to bring all parties to the court in order to ensure prompt and equitable compensation in these cases. In particular, application of the sovereign immunity and related principles may in many cases render court action against foreign states or foreign governmental entities providing ATC or GNSS signals, facilities and services in countries other than their home states difficult or impossible"^{xiii}.

Sovereign Immunity limitations:

Under United States Foreign Sovereign Immunities Act of 1976 foreign state shall be immune from the jurisdiction of the courts of the United State except in which the action is based upon a commercial activity carried on in the United States by the foreign state; or upon an act performed in the United States in connection with a commercial activity of the foreign state elsewhere. Similarly United Kingdom State Immunity Act 1978 or 1985 Foreign States Immunities Act of Australia accord a State, immunity from the jurisdiction of the Courts in United Kingdom or Australia. Article VI of the Outer Space Treaty provides international responsibility for national activities in outer space

whether such activities carried by governmental agencies or non governmental agencies. State Responsibility couched in Art VI does not help to bring any actions in national courts because of State immunity. GPS^{xiv} being essentially part of US Defense system and provided free of costs, availability and accessibility is a policy decision; therefore it may not be possible to sue US government for merely providing interoperated service in UK or Australia..

Jurisdiction for claim Actor sequitor forum rei- A pursuer follows the forum or court of defendant. In the context of interoperability for an end user what matters at receiver level. He is not in a position discern or gather conditions integrating signal .This could drive him for forum shopping. He may not be able to sue in US or UK, but certainly he can sue in India, discarding US, if the one of the system interoperated is that of India because in India sovereign immunity protection is not available. Under section 86 of Civil Procedure Code in India, a suit against foreign state is maintainable with consent of Central Government.

Product liability "Product liability" is defined as, "the legal liability of manufacturers and sellers to compensate buyers, users, and even bystanders, for damages or

injuries suffered because of defects in goods purchased^{xv}. Product liability rest with manufacture of Product (see article 1 of EC Directive 87/374/EEC)^{xvi}.In the GNSS context it may not have much significance as manufacturer of hardware likely to have contractual obligation with GNSS entity, however third party concerned who may use product of manufacturer need not rest his claim for use of GNSS core system by manufacturer but he can seek claim directly against the manufacturer. Art .4 of Hague Conference on Private International Law on Product Liability provides applicable law shall be the internal law of the State of the place of injury or the place of the habitual residence of the person directly suffering damage or the principal place of business of the person claimed to be liable or the place where the product was acquired by the person directly suffering damage.

Multi country tort/multiple tort feason. The program contents of broadcasts will on occasion give rise to claims of injury to private law interests, including the interest in reputation. Transmission may give rise to liability under one national system but to no liability under another. Defamation via satellite will have serious implication in the context of Interoperability .Fastening liability and

jurisdiction is an issue to be dealt under private international law. For traffic accidents on account of defect or bad signal, third parties to have recourse for actions among persons liable are difficult. Under Hague convention of private international law on traffic accidents^{xvii} the applicable law is the internal law of the State where the accident occurred. It may be difficult for injured in a member country of Convention to choose a tortfeasor in such circumstances in the light of sovereign immunity context as well. Therefore to fasten joint and several liabilities, it is necessary to specify by a legal regime so as to create a fiction of common liability among interoperable entities.

Intellectual property

Increasing commercialization of outer space particularly significant in the sphere of direct broadcasting and remote sensing where interoperability may have substantial bearing raises issues related to copy right, patent etc. Luxenberg is of the opinion that strong protection of intellectual property either used in space or transmitted in space activities is vital for the private sector to have sufficient incentive to invest in commercial activities and for commercial of space^{xviii}. "What does merit special attention however typically in the corner of space law, is the fact the

broadband signals emitted by satellite have broad geographical coverage on earth often going beyond national boundaries"^{xix}. Under 1974 Brussels Convention Relating to the distribution of programme carrying signals transmitted by satellite, each Contracting State undertakes to take adequate measures to prevent the distribution on or from its territory of any programme-carrying signal by any distributor for whom the signal emitted to or passing through the satellite is not intended. This obligation shall apply where the originating organization is a national of another Contracting State and where the signal distributed is a derived signal (Art 2). Unless Institutionalized mechanism among Interoperable entities is established it may have serious ramifications and implications of violation of copy rights obliterating objectives of the above Convention. Therefore international system should be established under which measures would be provided to prevent distributors from distributing programme-carrying signals transmitted by interoperable satellite which were not intended for those distributor.

The revenue potential of satellite navigation lies in the user segment, with the number of users likely to increase substantially. Patents may cover inventions relating to the methods used by GNSS receivers

for capturing and demodulating the signals and for the related processing algorithms. They can also cover signal content and chipsets to be built into GNSS receivers. The protection given by copyright may also be relevant in certain areas; particularly in signal processing and signal content^{xx}. Intellectual property rights are often called as negative rights. It may be difficult to protect such rights without having precise protection in user segment country. It may be a defense for a violator that signal content is that of the entity it does not have protection or used in a country where, national legislation does not offer any protection, it must be noted Intellectual property rights are protected under national legislations.

“Distribution of satellite channel through out the world using different satellite system is not only contrary to the 1982 UN Resolution on Direct Television Broad casting by Satellite^{xxi} but also illegal as it violates international radio regulations^{xxii}. The above Resolution principally lay that States shall co-operate on a bilateral and multilateral basis for protection of copyright and neighbouring rights by means of appropriate agreements between the interested or the competent legal entities acting under the jurisdiction. It may be difficult to protect interest of third party in respect of copyright and neighbouring rights as mandated

in the above Resolution as interoperability of navigation system is not contemplated under it.

Personal data and privacy issues

The capability of satellite navigation technology to locate and trace a person or people and goods has implications for privacy issues. The rights to privacy are highly developed law in Europe. All Member States European Union are signatories to European Convention Human Rights which guarantees respect for “private and family life, home and correspondence”. Most privacy issues are related to satellite navigation is covered by the Directive 95/46/EC^{xxiii} and Directive 2002/58/EC^{xxiv}. Transfer of personal data to a third country which does not ensure an adequate level of protection is prohibited under Directive 95/46/EC. In the event of GALILEO^{xxv} being interoperated with other system it may difficult to protect the privacy issue of the subjects in the light of above Directives in third country.

“Many commercial and public fleets are turning to satellite-based tracking technologies for tracking and coordination of vehicles, untethered trailers and other assets. These technologies can significantly reduce operating costs, facilitate “just in time” manufacturing and delivery without the need to maintain large inventories, and improve cargo security. In the trucking industry, satellite-based Automatic Vehicle Location (AVL) technologies are

used for precise position and load status reporting. Truck drivers have expressed similar concerns, claiming that fleet owners do not have a right to detailed information regarding how they traveled from point of pickup to point of delivery^{xxvi}

.It is not precisely easy to protect such privacy issues in the use of interoperable navigation system.

Conclusions

Towards Codified Private International law. There are four distinct stages in the conflict resolution process^{xxvii}. They are

- (I) Determination by the court of its jurisdictional competence (ii) Classification or characterization of the cause of action that entails allocation of the issue involved in a case to its correct legal category (iii) Identification by the court of the *lex causae* or the law that governs the cause of action. (iv) Recognition and enforcement of its judgment by the concerned foreign court.

Interoperable GNSS poses varieties of issues relating to jurisdiction. Courts of competent jurisdiction with reference to cause of action is highly impossible to determine if normal rule of *lex loci delicti commissi* is followed. Conflict of laws is a necessary part of the law of every country because different countries have different legal system containing different rules, and some adjustment is necessary when events or transactions are not confined within borders of a single country^{xxviii}. Private international law (conflict of laws) primarily seeks its harmonization and codification. The *lex loci delicti*

commissi is the Latin term for "law of the place where the tort was committed. Habitual residence of the victim will in many outer space related cases is preferable to the application of *lex loci*^{xxix}. This will also certainly prevent Forum shopping. Therefore it is necessary to have a codification to harmonize jurisdiction based on *lex domicilii*- place of habitual residence.

Admissibility of evidence gathered through space technology in national courts and arbitration is new area of concern under Private International law. More and more commercial transaction and commercial activities opt for arbitration courts in place of the national court system due to several reasons. Hence, it is necessary to have a legal regime to lay the issues of admissibility of evidence gathered through space technology to be used in national courts or in arbitration courts relating to admissibility of evidence collected using space technology. The main evidentiary issues relating to admissibility that would be scrutinized are:

1. Chain of Custody
2. Meaning of 'Original'
3. Documentation of digital data
4. issue of data tampering

All the evidence collected with the help of space technology is digital evidence and therefore have the quality of any digital evidence. Even with all the similarity of evidence collected using space technology with the other forms of digital evidence like photography etc., the space technology evidence has its own quality and distinction from other forms digital evidence. Ways of authentication, Need of qualified

experts, and how to make legal system more adaptable to new technology are some of the issue and implication of interoperable GNSS. It is therefore necessary to respond to this issue internationally.

Interoperability allows navigation with signals from different systems with minimal additional receiver cost or complexity. Multiple constellations broad casting interoperable open signals will result in improved observed geometry, increasing end user accuracy. Consumers or end users are certainly looking forward to have better capabilities of GNSS use. To have a complete legal foundation on GNSS, we need to forward to know potential future which is not far away.

ⁱ Williams ,Maureen ‘winds of change’ discussion paper presented at the III UN workshop on space law held in Rio de Janeiro Nov 2004

ⁱⁱ <http://history.nasa.gov/SP-4407/vol4/cover.pdf> viewed on 6/08/09

ⁱⁱⁱ The Role of private international law in the regulation of outer space , ICLQ39(1990)918-22and chapter 4 above

^{iv} Global Navigation Satellite System (GNSS) is the standard generic term for satellite navigation systems that provide autonomous geo-spatial positioning with global coverage. A GNSS allows small electronic receivers to determine their location (longitude, latitude, and altitude) to within a few metres using time signals transmitted along a line of sight by radio from satellites. Receivers on the ground with a fixed position can also be used to calculate the precise time as a reference for scientific experiments

^v www.unoosa.org/oosa/en/SAP/gnss/icg.html viewed on 27/08/09

^{vi} See Annex III ICG/PF/TOR/DEC2008 the third meeting of the international committee on satellite navigations systems.

^{vii} See Appendix..ibid.

^{viii} convention on International Liability for Damage Caused by Space objectives opened for signature on 29 March 1972

^{ix} Legal aspects relating to satellite navigation air traffic management with specific reference to GAGAN in India, a paper presented in IAC2007 Copy right IAF.

^xThe law and policy of air and space , a comparative approach By P.P.C Haanappel publ. Kluwer Law International p.99

^{xi} Chesire and North’s Private International law Ind ed. Pub. Oxford p.7

^{xii} Interneational Civil Aviation Organization, a specialized agency of the United Nations ,has is head quarters in Montreal ,Canada.

^{xiii} Report to the Assembly 35th session ICAO for its consideration dt 28/07/04

^{xiv} Global Positioning System (GPS) is a U.S. space-based radio navigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis -- freely available to all.

^{xv} See Black’s Law Dictionary

^{xvi} On the approximations of the laws, regulations and administrative provisions of the member states concerning liability for products(OJL 210 7.81985 P.25)

^{xvii} CONVENTION ON THE LAW APPLICABLE TO TRAFFIC ACCIDENTS (Concluded 4 May 1971)(Entered into force 3 June 1975)

^{xviii} Luxenberg ‘ protecting Intellectual property in space’ proceedings of 27th Colloquium

^{xix} The law and policy of outer space by P.P.C Haanappel p. 101 pub Kluwer law international

^{xx} Green paper on satellite navigations, Commission of the European Communities 8.12.06

^{xxi} Principles Governing the use by States of Artificial earth satellite for international direct television brad casting UN.General Assembly resolution 37/92 adopted on 10 December 1982

^{xxii} Commenatary paper onspace –based telecommunications including Tel –Education & Tele-medicine bYy Prof Ram JAKHU , ISRO-IISLSpace law coference 2005

^{xxiii} Directive of the European Parliament and the Council of 24 October 1995 of the protection of individuals with regard to the processing of personal data and on the movement of such data

^{xxiv} Directive of the European Parliament and of the Council of July 2002 concerning the

processing of personal data and protection of privacy in the electronic communication sector.

^{xxv} GALILEO is the European satellite radio navigation and positioning programme.

Launched by the European Commission and developed jointly with the European Space Agency, it gives the European Union (EU) an independent technology to compete with the American GPS and Russian GLONASS systems.

^{xxvi} GPS: Charting New Terrain – Legal Issues Related to GPS-Based Navigation and Location Systems By HOWREY LLP in

http://www.constructionweblinks.com/Resources/Industry_Reports__Newsletters/April_1999/april_1999.html

^{xxvii} Prof. V.C Govindaraj “Private International law/conflict of laws-nature and scope .p.1 of project studies on Non-Resident Indians and Private International Law Pub. ISIL Hope India .2008ed.

^{xxviii} Halsbury’s laws of India v.10 p.211pub .Butterworths

^{xxix} The law and policy of Air space and outer space , A comparative approach by Pro P.P.C Haanappel p.100